

DETAILED ACTION

1. Applicant's arguments filed This office action is in response to the amendment, filed 10 July 2008, which amends claims 24, 25, 31, 40, 43, 46 and 47, and cancels claims 29, 30, 41, 42, 48 and 49. Claims 24-28, 31-40, 43-47, 50 and 51 are pending.

2. The rejections of:

claims 25, 43 and 47 under 35 USC 112, second paragraph, are overcome by the amendment, filed 10 July 2008;

claims 48 and 49 under 35 USC 112, second paragraph, are overcome by the amendment, filed 10 July 2008, due to cancellation of the claims;

claims 29 and 30 under 35 USC 102(b) as anticipated by Terasaka, US 5,770,305, are overcome due to cancellation of the claims;

claims 29, 30, 41, 42, 48, 49 under 35 USC 102(b) as being anticipated by Yamakawa et al., WO 03/102071, are overcome due to cancellation of the claims;

and;

claims 41, 42, 48, 49 under 35 USC 103(a) as unpatentable over Terasaka, US 5,770,305, are overcome due to cancellation of the claims.

3. The objection to:

claim 29 for minor informalities is overcome by the amendment, due to cancellation of claim 29.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 24, 25, 26, 31, 32, 35, 37, 40, 43 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Terasaka, US 5,770,305.

As to claims 24, 25, 29, 32, 40, 43, 44:

Column 2, line 65 through column 3, line 9 with reference to figure 4, teach an anisotropic conductive film (ACF) comprising an epoxy resin. Conductive particles dispersed in the resin can be Titanium – Nickel alloy.

Column 1, lines 11-24, teach the positioning of the anisotropic conductive film prior to the application of pressure. This is equated with providing the film when the particles are unstressed and thus austenitic. The passage additionally teaches ACFs can be formed from thermoplastic resins.

The incorporation of shape memory particles in the resin of Terasaka is held to inherently improve a physical property of the resinous base material. The instant specification does not indicate any special process or mechanism for achieving the claimed property other than the incorporation of shape memory alloy particles. It is reasonable to assume such incorporation in the prior art would inherently yield the same property.

As to claims 30, 31, 35:

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Column 2, line 65 through column 3, line 9 with reference to figure 4, further teaches that the alloy expands or contracts in response to stress and the alloy particles can be crushed due to stress. The process of expansion and contraction in response to stress is equated with resulting in austenitic and martensitic phases and mixtures thereof over the course of the phase transition. The various shapes encompassed by the base particles and stress induced deformations is held to encompass spheres, ovals, and cylinders.

As to claim 37:

Column 3, lines 17-18, teach that the particles have a mean particle size of $8\mu\text{m}$.

As to claim 26:

Column 3, lines 33-38 with reference to figure 5, teach that the alloy content of the resin is 3 weight percent. The density of nickel-titanium alloy is about 6.5 g/cm^3 and the density of for example, phenolic resin is about 1.25 g/cm^3 . This results in a volume percentage of about 0.58 percent.

6. Claims 24-28, 31, 33, 35-38, 40, 43-47, 50 and 51 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamakawa et al., WO 03/102071.

Yamakawa teaches:

As to claims 24, 25, 31, 33, 40, 43, 46, 47:

Paragraph [0005], teaches a composition comprising (A) a curable liquid polymer, (B) a shape-memory alloy filler, and (C) a thermoconductive filler.

Paragraph [0007], teaches that during the pre-curing, curing, or post-curing process it is necessary to raise the temperature above the transition point of the shape-memory alloy.

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This is held to teach that the particles can be combined with the resin either in the martensitic state and heated post-curing or in the austenitic state by pre-heating. The passage additionally teaches thermosetting resins are preferred.

As to claims 26-28, 35-38, 44, 45, 50, 51:

Paragraph [0008], teaches the shape-memory alloy can be nickel-titanium. The paragraph also teaches that the shape-memory alloy can be in the form of particles. The average particle diameter is in the range of 5 to 500 microns. This size range is held to encompass granules. The teaching of fibers is equated with cylinders and spheres due to the teaching in paragraph [0008] of the diameters and lengths of the fibers. Additionally, the average diameter teaching with regard to plates is held as encompassing an oval. The paragraph additionally teaches it is recommended to use component (B), (shape-memory alloy), in an amount of 0.01 to 30 weight percent, preferably 0.1 to 20 weight percent.

Paragraph [0007], teaches the amount of the resin (A) can be as low as 2 weight percent and that the amount of filler (C) can be as low as 30 weight percent. As such component (B), the shape memory alloy particles, can be present in an amount up to 68 weight percent.

The density of nickel-titanium alloy is about 6.5 g/cm^3 and the density of for example, phenolic resin is about 1.25 g/cm^3 . This results in a range of volume percentages which overlaps the claim ranges of less than 1 to over 50 volume percent of the instant invention.

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Paragraph [0010], teaches the composition can be used as an adhesive. The passage additionally teaches that the viscosity of the composition can be controlled over a wide range.

Paragraph [0022], teaches the composition functions as a protective layer.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 27, 28, 36, 38, 39, 45-47, 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Terasaka, US 5,770,305, as applied to claims 24, 25, 26, 31, 32, 35, 37, 40, 43 and 44 above, as evidenced by <http://herkules.oulu.fi/isbn9514252217/html/x317.html>, Fundamental characteristics of nickel-titanium shape memory alloy, Oulun Yliopisto.

The teachings of Terasaka as in the rejection above are relied upon.

As to claims 34, 46:

Terasaka does not teach the use of his resin within a mold.

It would have been obvious to one of ordinary skill in the art at the time of invention to formulate the resin viscosity for ease of application in order to conform to the gap between the electrodes or gap within a mold. It would have been obvious to one of

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ordinary skill in the art to expect that the effects of temperature and pressure can be controlled to cure the resin in a controlled space.

As to claims 36, 51:

The limitation of granules is held to be encompassed within the particle size distribution disclosure of a mean particle size of $8\mu\text{m}$.

As to claims 27, 28, 38, 45:

Terasaka further does recite a volume percent for amount of alloy within the resinous material. Column 3, lines 33-38 with reference to figure 5 teach that the alloy content of the resin is 3 weight percent. The density of nickel-titanium alloy is about 6.5 g/cm^3 and the density of for example, phenolic resin is about 1.25 g/cm^3 . This results in a volume percentage of about 0.58 percent. This teaching is held to suggest about 1 volume percent as required by claim 27. It would have been obvious to one of ordinary skill in the art to expect that larger percentages of nickel-titanium alloy, currently used to provide an electrical connection, would continue to provide an interconnected electrical pathway in the device of Terasaka due to the conductivity of the metal alloy and the increased density of the conductive particles.

As to claims 39, 47, 50:

The teachings of Terasaka in the above rejection under 35 USC 102, address the teachings of these limitations.

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9. Claims 32, 34 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamakawa et al., WO 03/102071, as applied to claims 24-28, 31, 33, 35-38, 40, 43-47, 50 and 51 above, and further in view of Jenline Industries, <http://www.jenline.com/>.

The teachings of Yamakawa as in the rejection above are relied upon.

As to claims 32, 34:

Yamakawa teaches:

Paragraph [0007], teaches resins other than thermosetting resins can be used as resinous component (A). The passage additionally teaches suitable materials for the resinous component including silicones.

Jenline Industries teaches:

The reference teaches thermoplastic silicones are useful in injection molding applications.

It would have been obvious to one of ordinary skill in the art to expect the silicone injection molding process of Jenline, useful in forming molded parts, to form a silicone part having high thermal conductivity when applied to the thermally conductive silicone resin composition doped with conductive nickel titanium particles of Yamakawa.

As to claim 39:

Yamakawa does not recite a particle size of less than 0.005microns for the shape memory alloy particles of component (B).

It would have been obvious to one of ordinary skill in the art to optimize the particle size of the composition of Yamakawa as part of the control of the rheological properties of the composition.

Double Patenting

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 25-28, 32, 33, 35, 36, 40 and 43-51 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 5-8, 11, 12-15, 18-24 and 27-29 of copending Application No. 10/675,557. Although the conflicting claims are not identical, they are not patentably distinct from each other because the copending application claims an adhesive base material which is equated with a resinous base material as claimed in the instant invention. The subsequent dependent claims provide the compositional proportions and material structures as claimed in the instant invention.

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This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

12. Claims 25-28, 32, 33, 35, 36, 40, 43-47, 50 and 51 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7, 11-13 and 26-35 of copending Application No. 10/674,930. Although the conflicting claims are not identical, they are not patentably distinct from each other because the copending application claims a flowable base material which can be equated with the base material as claimed in the instant invention. The subsequent dependent claims provide the compositional proportions and material structures as claimed in the instant invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

13. Applicant's arguments have been fully considered but they are not persuasive.

Applicant argues with respect to the Terasaka reference that "Terasaka requires the particles to be in a compressed state initially when formed into the film, and further relies on the reversion of the particles back to their "unstressed" state (i.e., austenitic state), upon the resin of the film expanding due to a temperature increase. As such, with Terasaka, the SMA particles must be heated and must start in the martensitic state so that when the temperature reaches the transition temperature of the alloy, they convert to their austenitic state."

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Applicant also states “With the resin of the present application, it is especially beneficial for the SMA particles to start in their austenitic state. This is because the stress-induced phase change (i.e., caused by an impact), the process which dissipates energy, is reversible. That is, the SMA particles can perform their function repeatedly, potentially thousands of times, as long as the particle's strain doesn't exceed roughly 8-10% (for NiTi).”

The operation of the material of Terasaka provides for the shape memory alloy (SMA) particles of Terasaka to perform their function repeatedly during the operation of the device due to a stress induced state change. The particles of Terasaka cycle between the martensitic and austenitic states of the material. While the SMA particles of Terasaka are in the austenitic state the resin embodies the composition as claimed by applicant in the instant claims, i.e. a resin having a plurality of austenitic shape memory alloy (SMA) particles therein. The SMA particles in the austenitic state are then able to absorb mechanical energy provided by an external source by undergoing a stress induced phase change to the martensitic state.

With respect to the rejection over Yamakawa applicant argues that the heating of the particles above their transition temperature pre-curing, curing or post-curing of the resin causes the particles to be in the martensitic state. The heating of SMA particles above their transition temperature will cause the particles to be in the austenitic state. The SMA particles in the resin in the austenitic state will meet the composition claims of the instant invention. The SMA particles in the austenitic state are then able to absorb mechanical

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energy provided by an external source by undergoing a stress induced phase change to the martensitic state.

With respect to the double patenting rejection over 10/675,557, applicant has indicated that a terminal disclaimer is being submitted. Currently, no terminal disclaimer has been recorded for the case.

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brett A. Crouse whose telephone number is (571)-272-6494. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald L. Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/B. A. C./
Examiner, Art Unit 1794

/Bruce H Hess/

Primary Examiner, Art Unit 1794